

## Appendix B

### COPY OF CLAIMS SHOWING AMENDMENTS

(Deletions are shown by ~~strikethrough~~ and additions are underlined)

1. *(Amended Once)* A bio-assay test system comprising:  
a test fixture comprising:  
    a bio-assay device comprising a multiple-port signal path, the  
multiple-port signal path having at least one signal input port and one signal output port, the  
multiple-port signal path operable to support the propagation of a test signal at one or more  
frequencies from 10 MHz to 1000 GHz and comprising:  
        a transmission line connected between the at least one  
signal input port and the at least one signal output port;  
        a ground element; and  
        a dielectric substrate attached between the transmission line  
and ground element; and  
        a retaining structure sample cavity configured to place retain a  
volume of sample adjacent to the multiple-port signal path, comprising molecular structures in  
electromagnetic communication with the signal path whereby an input test signal propagating  
along the multiple-port signal path is electromagnetically coupled to the sample; and  
        a measurement system having an output connected to the at least one  
signal input port of the multiple-port signal path and an input connected to the at least one signal  
output port of the multiple-port signal path, the measurement system configured to transmit the  
input test signals to the multiple-port signal path at one or more predefined frequencies, and to  
receive a modulated test signals from the multiple-port signal path at one or more predefined  
frequencies; and  
        a computer coupled connected to the measurement system and configured  
to control the measurement system's transmission and reception of the input test signals to and  
from the measurement system and reception of the modulated test signal.

2. *(Amended Once)* The ~~single path~~ bio-assay test system of claim 1, wherein the measurement system comprises a vector network analyzer configured to compare the magnitude and phase response of the ~~received~~ modulated test signal to the magnitude and phase response of the ~~transmitted~~ input test signal.

3. *(Amended Once)* The ~~single path~~ bio-assay test system of claim 2, wherein the input test signals comprises a signals in the range ~~of~~ from 5 Hz to 300 MHz.

4. *(Amended Once)* The ~~single path~~ bio-assay test system of claim 2, wherein the input test signals comprises a signals in the range ~~of~~ from 45 MHz to 40 GHz.

5. *(Amended Once)* The ~~single path~~ bio-assay test system of claim 2, wherein the input test signals comprises a signals in the range ~~of~~ from 33 GHz to 110 GHz.

8. *(Amended Once)* The ~~single path~~ bio-assay test system of claim 2, wherein the bio-assay device multiple-port signal path comprises a ring resonator circuit.

11. *(Amended Once)* The ~~single path~~ bio-assay test system of claim 2, wherein the ~~retaining structure~~ further comprising an O-ring removably compressed around a portion of the signal path, the O-ring configured to hold the sample ~~solution~~ in contact with the multiple-port signal path.

12. *(Amended Once)* The ~~single path~~ bio-assay test system of claim 2, further comprising:

an input connector ~~coupled~~ connected between the measurement system and a ~~first~~ the at least one signal input port of the multiple-port signal path; and

an output connector ~~coupled~~ connected between the measurement system and a ~~second~~ the at least one signal output port of the multiple-port signal path.

13. *(Amended Once)* A bio-assay array test system, comprising:

a test fixture comprising:

a bio-assay device comprising a plurality of multiple-port signal paths, each multiple-port signal path having at least one signal input port and one signal output port, the multiple-port signal path operable to support the propagation of a test signal at one or more frequencies from 10 MHz to 1000 GHz and comprising:

a transmission line connected between the at least one signal input port and the at least one signal output port;  
a ground element; and  
a dielectric substrate attached between the transmission line and ground element; and

a plurality of retaining structures sample cavities, each of said sample cavities configured to place retain a volume of sample adjacent to at least one of said plurality of multiple-port signal paths, comprising molecular structures in electromagnetic communication with each of the plurality of signal paths whereby an input test signal propagating along the at least one multiple-port signal path is electromagnetically coupled to the adjacently located sample;

a measurement system having at least one output an output connected to the at least one signal input port of the multiple-port signal path and an input connected to the at least one signal output port of the multiple-port signal path, the measurement system configured to transmit, at one or more predefined frequencies, the input test signals to one or more of the plurality of multiple-port signal paths and to receive a modulated test signals from one or more of the plurality of multiple-port signal paths at one or more predefined frequencies; and

a computer coupled connected to the measurement system and configured to control the measurement system's transmission and reception of the input test signals to and from the measurement system and reception of the modulated test signal.

14. *(Amended Once)* The bio-assay array test system of claim 13, wherein the measurement system comprises one output port and one input port, and wherein the bio-assay array comprises ~~N~~ a first plurality of signal input ports coupled connected to the plurality of

multiple-port signal paths and M a second plurality of signal output ports coupled connected to the plurality of multiple-port signal paths, the bio-assay system further comprising:

an 1xN input switch having an input coupled connected to the measurement system output port and an output coupled connected to the N first plurality of multiple-port signal path input ports; and

an Mx1 output switch having an input coupled connected to the M second plurality of multiple-port signal path output ports and an output coupled connected to the measurement system input port.

17. *(Amended Once)* The bio-assay array test system of claim 13, wherein at least one of the plurality of bio-assay arrays multiple-port signal paths comprises a ring resonator circuit.

20. *(Amended Once)* The bio-assay array test system of claim 13, wherein at least one of the plurality of bio-assay arrays multiple-port signal paths comprises an electronically switched transistor.

21. *(Amended Once)* The bio-assay array test system of claim 13, wherein at least one of the plurality of bio-assay arrays multiple-port signal paths comprises an optically switched transistor.

22. *(Amended Once)* The bio-assay array test system of claim 13, wherein the input test signals comprises a signals in the range of from 5 Hz to 300 MHz.

23. *(Amended Once)* The bio-assay array test system of claim 13, wherein the input test signals comprises a signals in the range of from 45 MHz to 40 GHz.

24. *(Amended Once)* The bio-assay array test system of claim 13, wherein the input test signals comprises a signals in the range of from 30 GHz to 110 GHz.

25. *(Amended Once)* A bio-assay test fixture device, comprising:  
a multiple-port signal path having an at least one signal input port and an at least one signal output port, the multiple-port signal operable to support the propagation of a test signal at one or more frequencies from 10 MHz to 1000 GHz and path comprising:  
a transmission line connected between the at least one signal input port and the at least one signal output port;  
a ground element; and  
a dielectric substrate attached between the transmission line and ground element; and  
a retaining structure sample cavity configured to place retain a volume of sample adjacent to the multiple-port signal path, comprising molecular structures in electromagnetic communication with the signal path whereby an input test signal propagating along the multiple-port signal path is electromagnetically coupled to the sample;

28. *(Amended Once)* The bio-assay test fixture device of claim 25, wherein the multiple-port signal path comprises a resonant cavity circuit.

31. *(Amended Once)* A bio-assay array test fixture device, comprising a plurality of multiple-port signal paths, each multiple-port signal path having an at least one signal input port and an at least one signal output port, the multiple-port signal path operable to support the propagation of a test signal at one or more frequencies from 10 MHz to 1000 GHz and comprising:

a transmission line connected between the at least one signal input port and the at least one signal output port;

a ground element; and

a dielectric substrate attached between the transmission line and ground element; and

a respective plurality of retaining structures sample cavities, each of said sample cavities configured to place retain a volume of sample adjacent to at least one of said plurality of multiple-port signal paths comprising molecular structures in electromagnetic

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~~communication with at least a portion of each of the plurality of signal paths whereby an input test signal propagating along said at least one multiple-port signal path is electromagnetically coupled to the adjacently located sample.~~

32. *(Amended Once)* The bio-assay array test fixture device of claim 31, wherein each multiple-port signal path comprises an electrically-switched transistor.

33. *(Amended Once)* The bio-assay array test fixture device of claim 31, wherein each multiple-port signal path comprises an optically-switched transistor.